



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT

Application No.: 09/965,423
Filing Date: September 27, 2001
Applicants: Ali Rihan et al.
Group Art Unit: 1713
Examiner: Tatyana Zalukaeva
Title: Fast Drying Clearcoat Refinish Composition
Docket Nos.: IN-5501 (BASF)
0906-000311 (Harness, Dickey & Pierce)

Director of the United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Appeal Brief Under 37 C.F.R. § 41.37

Sir:

This is an appeal from the Office Action mailed May 6, 2004,
finally rejecting claims 1-25. A Notice of Appeal was mailed on August 2, 2004
appealing all of the rejected claims. This Appeal Brief is due without extension
on October 4, 2004, as October 2 falls on Saturday.

This Brief is accompanied by the fee under 37 C.F.R. § 41.20(b)(2).

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Real Party in Interest

The real party in interest is BASF Corporation, a corporation of the State of Delaware, to which the inventors assigned all rights in this invention. The assignment was recorded in the United States Patent and Trademark Office on September 27, 2001 at reel 012212, frame 0441.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

All of the claims, claims 1-25, are pending in the application and stand finally rejected. This appeal is taken as to all of the claims, claims 1-25.

Status of Amendments

No amendment was filed after the final rejection.

Summary of Claimed Subject Matter

Applicants claim refinish clearcoat compositions (claims 1-12, 22, and 23), refinish multi-component clearcoat coating compositions (claims 13-15), methods of refinishing a substrate (claims 16-20, 24, and 25), and a refinished substrate prepared according to the claimed method of refinishing (claim 21).

Applicants submitted with the Reply of December 17, 2002 an excerpt from the article "Coatings" from the *Encyclopedia of Polymer Science and Engineering* Supp. Vol., 118-19 (H.F. Mark, ed. 1989) to show that automotive refinish coating compositions are recognized in the art as a distinct coatings technology. This excerpt is attached in the Evidence Appendix.

(a) The refinish clearcoat compositions of claims 1-12, 22, and 23.

The compositions of claims 1-12, 22, and 23 are refinish clearcoat compositions. Refinish topcoat coatings, like the original finish topcoats, may be applied in two layers, a first layer of a pigmented basecoat composition and a second layer of an unpigmented, clearcoat composition. Page 1, lines 11-20 & page 2, line 20. Unlike the original finish topcoats, automotive refinish topcoats must either be thermoplastic or be curable at ambient temperature at low temperature (e.g., up to 150F). Page 1, lines 20-25 & page 2, lines 10-14. The applied refinish coating may not fully cure for days, but it is desirable to have the applied coating become "dry to handle" in a short time. Page 2, lines 2-9. While cellulose acetate butyrate resins have been added to refinish coating compositions in the past to shorten the dry to handle time, adding the cellulose acetate butyrate resins is undesirable because they are relatively expensive and require more organic solvent be added in the coating composition. Page 3, lines 2-7.

The refinish clearcoat compositions of claims 1-12, 22, and 23 include hydroxyl-functional acrylic polymers (a). Page 3, lines 14-15. The acrylic polymer (a) has a number average molecular weight of at least about 5000 and is polymerized using at least about 45% by weight cycloaliphatic monomer, based on total weight of monomer polymerized. Page 3, lines 15-18. Paragraph 12 contains examples of suitable cycloaliphatic monomers.

The refinish clearcoat compositions of claims 1-12, 22, and 23 also include at least one film-forming polymer (b) different from the hydroxyl-functional acrylic polymer (a), for example one selected from polyesters, polyurethanes, or other acrylic polymers. Page 10, lines 13-16. The hydroxyl-functional acrylic polymer (a) is from about 5% to about 60% by weight of the combined weights of itself and the film-forming polymer(s) (b). Page 3, lines 19-21.

The refinish clearcoat compositions of claims 1-12, 22, and 23 may also include a curing agent for the acrylic polymer (a) and/or the film-forming polymer (b). Page 15, lines 12-14.

The refinish clearcoat compositions of claim 23 has a number average molecular weight of at least about 8000. Page 5, lines 4-5.

In claims 11 and 12, an about 55% weight solution of the acrylic polymer of (a) in n-butyl acetate has a viscosity less than or equal to about 10 Stokes (claim 11) and 8.8 Stokes (claim 12). Page 9, lines 10-13.

(b) The refinish multi-component clearcoat coating compositions of claims 13-15

The clearcoat of the invention may be prepared from a multi-component coating composition. Page 4, lines 3-4. "Multi-component coating compositions" are common in the field of refinish coatings, and, as explained in lines 10-24 of page 2, have separately stored components that are combined only shortly before application of the coating composition to the substrate. The claimed refinish multi-component compositions have a first component comprising the hydroxyl-functional acrylic polymer (a) and film-forming polymer (b) as described already, with the hydroxyl-functional acrylic polymer (a) again being about 5% up to about 60% by weight of the combined weights of itself and the film forming polymer or polymers. The refinish multi-component coating compositions have a second component comprising a curing agent reactive with one or both of the hydroxyl-functional acrylic polymer and film-forming polymer.

(c) The methods of refinishing a substrate of claims 16-20, 24, and 25 and
refinished substrate of claim 21

The claimed methods of refinishing a substrate have a steps of applying a layer of a refinish basecoat composition is applied to a desired area of the substrate, allowing the applied basecoat composition to dry, and applying over the layer of basecoat composition a refinish clearcoat composition. Page 16, line 22 to page 17, line 1. The refinish clearcoat composition has the limitations already described of comprising an hydroxyl-functional acrylic polymer of number average molecular weight of at least about 5000 and polymerized using at least about 45% by weight cycloaliphatic monomer, at least one film-forming polymer that is different from the hydroxyl-functional acrylic polymer, and optionally a curing agent. Again, the hydroxyl-functional acrylic polymer is from about 5% up to about 60% by weight of the combined weights of itself and the film forming polymer.

The refinished substrate of the invention is prepared according to the method of the invention.

(d) The properties of the refinish composition of the invention

The claimed refinish clearcoat compositions of claims 1-12, 22, and 23, that are prepared with the refinish multi-component coating compositions of claims 13-15, that are used in the methods of claims 16-20 , 24, and 25, are extremely fast drying, page 3, lines 22-23, and have particularly good wet sanding and buffing characteristics, page 4, lines 20-22. When the clearcoat compositions are cured by low temperature baking, the cured clearcoat surface may be taped without leaving tape marks as soon as the substrate is cooled. Page 17, lines 3-5.

The comparison between Example 2 of the invention and Comparative Example A illustrates the improved sanding and buffing properties and resistance to tape marks. The refinish clearcoat of Example 2 contained about 1 part by weight of an acrylic resin with at least 45% by weight of cycloaliphatic monomer (Example 1) and a number average molecular weight of at least 5000 to about 9 parts by weight of a second hydroxyl-functional acrylic polymer while Comparative Example A contained only the second hydroxyl-functional acrylic polymer. Examples 3 and 4 further illustrate the benefit of including the acrylic polymer as claimed, even in small amounts, for improved sanding and buffing and resistance to tape marks. Page 21, paragraph 52.

Applicants submitted with the Reply of December 17, 2002 declarations of Ali Rihan and Emerson Keith Colyer providing a comparison between the refinish clearcoat composition of the present invention and what Applicants considered to be the closest composition of Rink et al., U.S. Patent No. 5,759,631, which was polyacrylate resin E3. The E3 example had a very low number average molecular weight, 2711, which Mr. Colyer increased to 4100, at the high end of the Rink patent's reported preferred number average molecular weight range. This acrylic is designated Comparative Example B.

Mr. Rihan used the Comparative Example B acrylic resin to prepare a refinish clearcoat composition, designated Comparative Example C. Mr. Rihan performed tests on Comparative Example C and on a refinish clearcoat composition according to the invention, designated Example 5, containing the acrylic resin of Example 1 from the present application. Example 5 had a dust free time of 67.5 minutes, while Comparative Example C had a dust free

time of 82.5 minutes. Example 5 had a tack free time of 270 minutes, while Comparative Example C had a tack free time of 360 minutes.

Thus, Example 5 of the present invention provided a substantial reduction in both dust free time (22% less time) and tack free time (33% less time) compared to the closest example of the prior art, adjusted by Applicants to be even closer to the present invention in number average molecular weight than the actual example E3 in the prior art.

Grounds of Rejection to Be Reviewed on Appeal

Claims 1-22 stand rejected under 35 U.S.C. 102(b) as being anticipated by Rink et al., U.S. Patent No. 5,759,631.

Claims 1-16 and 22-25 stand rejected under 35 U.S.C. 103(a) as being anticipated [sic: obvious] by Rockrath et al., U.S. 5,616,678 in view of Rink et al., U.S. Patent No. 5,759,631.

Claims 1-3, 5-21, and 23-25 stand rejected under 35 U.S.C. 103(a) as being unpatentable over WO 97/22646 in view of Rink et al., U.S. Patent No. 5,759,631.

Argument

I. The Rink patent does not anticipate claims 1-22. because the Rink patent does not disclose an acrylic polymer polymerized using the claimed amount of at least about 45% by weight of a cycloaliphatic monomer, based on the total weight of monomers polymerized and having a number average molecular weight of at least about 5000.

To anticipate, the prior art must disclose the claimed range with sufficient specificity.

“An anticipating reference must describe the patented subject matter with sufficient clarity and detail to establish that the subject matter existed in the prior art and that such existence would be recognized by persons of ordinary skill in the field of the invention.” *Crown Operations International Ltd. v. Solutia Inc.*, 62 USPQ2d 1917, 1921 (Fed. Cir. 2002). If the claims are directed to only part of a broader range disclosed in the prior art, and there is evidence of unexpected results within the narrower, claimed range not disclosed or appreciated by the prior art, then the prior art does not disclose the claimed subject matter with the required specificity. *Ultradent Products Inc. v. Life-Like Cosmetics, Inc.*, 44 U.S.P.Q.2d 1336 (Fed. Cir. 1997) (to be anticipating, the prior patent must “describe to one of skill in the art the tested combinations, or other combinations meeting the limitations of the claims, from among the many possible candidates.” ; *Minnesota Mining and Manufacturing Co. v. Johnson & Johnson Orthopaedics Inc.*, 24 U.S.P.Q.2d 1321 (Fed. Cir. 1992) (no anticipation when the prior reference was not “exact enough to identify” what the parameters were that would produce the beneficial properties); MPEP 2131.03 (evidence of unexpected results within the claimed narrower range support conclusion narrower range not disclosed with “sufficient specificity” to anticipate).

Such is the present situation. The Rink patent discloses a polyacrylate resin that may have as little as 5 weight percent of cycloaliphatic (meth)acrylate. The Rink patent provides no

example of a resin including at least 45% by weight of a cycloaliphatic monomer. All of the examples the Rink patent discloses have less than 45% by weight of a cycloaliphatic monomer, and none of the examples have a number average molecular weight of at least about 5000.

Moreover, there is evidence of unexpected results in the Declarations of Ali Rihan and Emerson Keith Colyer submitted with the Reply of December 17, 2002 and included in the present Evidence Appendix. Applicants' claimed coating provides significantly shorter dust dry and tack-free times than those reported by the prior art reference. Applicants considered polyacrylate resin E3 to be the closest polyacrylate example in the Rink patent. The E3 example had an extremely low number average molecular weight, 2711, which, even increased to 4100, had significantly longer dust-free and tack-free times as compared to Appellants' invention. Example 5 according to the invention had a dust free time of 67.5 minutes, while Comparative Example C based on the Rink polyacrylate had a dust free time of 82.5 minutes. Example 5 of the invention had a tack free time of 270 minutes, while Comparative Example C had a tack free time of 360 minutes.

The other Rink patent examples of refinish clearcoats include polyacrylate resins with 14% by weight to 23% by weight t-butylcyclohexyl acrylate and number average molecular weights of from 2400 to 2700.

The Rink patent does not teach one of ordinary skill in the art how to craft a refinish clearcoat composition that will have the advantages of shorter dry times and shorter tack free times. Because the Rink patent does not disclose each and every limitation of the claims, Appellants respectfully submit that the present invention is patentable. Accordingly, Appellant requests that the rejection be REVERSED.

Claims 11 and 12 are further patentable over the Rink patent because the Rink patent does not teach or disclose composition comprising an acrylic polymer that, in an about 55% weight solution of the acrylic polymer in n-butyl acetate, has a viscosity less than or equal to about 10 Stokes (claim 11) and 8.8 Stokes (claim 12).

II. Claims 1-16 and 22-25 are patentable over Rockrath et al., U.S. 5,616,678 in view of Rink et al., U.S. Patent No. 5,759,631.

a, Claims 1-16 and 22-25 are patentable over Rockrath et al., U.S. 5,616,678 in view of Rink et al., U.S. Patent No. 5,759,631 because the Rockrath patent, which is directed to high bake, original finish compositions, would not suggest to one of ordinary skill in the art how to obtain the unexpected advantages of Applicants' invention in a refinish coating composition, refinish multi-component coating composition, or refinish method.

The Rockrath patent, while describing original finish coatings, does not disclose refinish coating compositions; nor does it provide any guidance to the person who wishes to make a fast-drying refinish composition to prevent tape marks. Instead the Rockrath patent is apparently directed toward obtaining coatings with improved acid resistance. See col. 2, lines 8-10 and lines 45-53. To obtain the desired properties, the Rockrath coatings are "baked under the baking conditions currently employed in the production-line finishing of cars (30 minutes at 130°C. or 20 minutes at 140°C." Col. 7, lines 24-28. It is an essential property of a refinish coating that it be curable under refinish conditions. The Rockrath composition requires the higher bake temperature of OEM coatings. It is not, therefore, a refinish coating.

As evidenced by the excerpt from the "Coatings" article from the Encyclopedia of Polymer Science and Engineering and the discussion in paragraphs 3 and 4 of the present application, automotive refinish coating compositions are recognized as a distinct coatings technology. One key attribute and requirement of a refinish coating is the ability to cure at room

temperature or a very low temperature of room temperature or up to about 150°F (65°C.). This important attribute is lacking in the Rockrath compositions, which must be cured at high bake temperatures. The Rockrath patent nowhere describes or suggests a refinish coating composition, nor does the Examiner contend that it does. Because it does not describe a refinish coating composition, however, it cannot anticipate the present claims.

Because the Rockrath patent is not concerned with refinish coating compositions, and furthermore, does not address the issue of shortening the “dry to handle time” with which the present invention is concerned, the Rockrath patent is nonanalogous art and is improperly combined in making the present rejection.

b, Claims 1-16 and 22-25 are patentable over Rockrath et al., U.S. 5,616,678 in view of Rink et al., U.S. Patent No. 5,759,631 because the Rockrath patent does not suggest using at least about 45% by weight of a cycloaliphatic monomer and does not suggest including a film-forming polymer in addition to a hydroxyl-functional acrylic polymer.

Even were the Rockrath patent available as prior art, the Rockrath patent, like the Rink patent, does not disclose with *sufficient specificity* a composition containing an acrylic polymer polymerized using the claimed amount of at least about 45% by weight of a cycloaliphatic monomer, based on the total weight of monomers polymerized. The Rockrath disclosure is even less specific than the Rink patent disclosure. While the Rink patent disclosed a broad range of 5-80 weight percent of a cycloaliphatic (meth)acrylate, the Rockrath need not contain a cycloaliphatic monomer at all, as it can instead contain any aliphatic monomer (i.e., linear also) ester of methacrylic acid which is different from its hydroxyl monomers that has at least 4 carbon atoms in the alcohol radical, or of a mixture of such monomers.

Just as for the Rink patent, Appellants' evidence of unexpected results for the refinish clearcoat composition of the invention containing an acrylic polymer having a number average molecular weight of at least about 5000 and polymerized using at least about 45% by weight of a cycloaliphatic monomer demonstrates that the Rockrath patent does not disclose the claimed range (and monomer) with sufficient specificity to establish anticipation.

In addition, the Rockrath patent does not teach or disclose refinish compositions including at least one film-forming polymer in addition to its polyacrylate resin. Moreover, the Rockrath patent does not teach or disclose that its polyacrylate resin should be from about 5% up to 60% by weight of the combined weight of its polyacrylate resin and of a film-forming polymer other than its polyacrylate.

The rationale offered by the Examiner for including a further film forming resin, "to enhance film forming properties and impart other desirable properties," listing a few properties that neither reference suggests are obtained by including additional resins, is not legally sufficient motivation required for prima facie obviousness. It may not even rise to the level of an invitation to experiment, as the invitation comes not from the references, but from the Examiner.

Accordingly, for any of these reasons, the rejection should be REVERSED.

- III. Claims 1-3, 5-21, and 23-25 are patentable over WO 97/22646 in view of Rink et al., U.S. Patent No. 5,759,631 because the WO '646 document does not suggest refinish compositions or methods.

As was the case with the Rockrath patent, the WO'646 document does not teach or disclose a refinish composition or method. The passage on page 10 and lines 1-10 of page 11 on

which the Examiner relies in making the rejection teaches a cure temperature of 160 to 350°F, well above feasible refinish curing temperatures.

Moreover, in the last paragraph on page 4, the WO'646 document teaches that its film forming composition is entirely made up of its acrylic solution polymer (60-90%) and its polyisocyanate crosslinking agent (10-40%). This passage leads one away from including any further film-forming polymer, such as the film-forming polymer (b) of the present claims. This description of the WO'646 document's film-forming composition on page 4 means that the reference is not "silent," as the Examiner characterizes it, but opposing addition of further film-forming materials.

The Examiner has suggested that, because the WO '646 document teaches that its coating composition may have further ingredients on page 8, lines 11-16, then it may also have further film forming materials. The ingredients contained in that paragraph, however, as well as the catalysts mentioned just above, are not part of the film-forming composition. See, again, the last paragraph on page 4 ("the acrylic solution polymer is typically present in the film-forming composition in an amount ranging from between about 60 to 90 weight percent On the other hand, the polyisocyanate is typically present in the film-forming composition in an amount ranging from between about 10 to about 40 weight percent . . .").

Even were this not so, the vague rationale the Office Action offers for turning to the Rink patent does not constitute legal motivation, as Applicants discussed with regard to the rejection of Rink in combination with the Rockrath patent.

Accordingly, for any of these reasons, the rejection should be REVERSED.

Conclusion

The present claims are patentable over the cited art. Applicants, therefore, respectfully petition this Honorable Board to reverse the final rejection of the claims on each ground and to indicate that all claims are allowable.

Respectfully submitted,

A handwritten signature in cursive script, reading "Anna M. Budde".

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Claim Appendix
Copy of the Claims Appealed

1. A refinish composition comprising
 - (a) an hydroxyl-functional acrylic polymer, wherein the acrylic polymer has a number average molecular weight of at least about 5000 and is polymerized using at least about 45% by weight of a cycloaliphatic monomer, based on the total weight of monomers polymerized,
 - (b) at least one film-forming polymer different from the acrylic polymer of (a), and
 - (c) optionally, at least one curing agent for the acrylic polymer of (a) and/or the film-forming polymer of (b),wherein the acrylic polymer of (a) is from about 5% up to about 60% by weight of the combined weight of the acrylic polymer of (a) and the film-forming polymer or polymers of (b) and further wherein the refinish composition is a refinish clearcoat composition.
2. A refinish composition according to claim 1, wherein the hydroxyl-functional acrylic polymer of (a) is at least about 2% by weight, based on nonvolatile binder material.
3. A refinish composition according to claim 1, wherein the hydroxyl-functional acrylic polymer of (a) is at least about 5% by weight, based on nonvolatile binder material.
4. A refinish composition according to claim 1, wherein the film-forming polymer or polymers of (b) different from the acrylic polymer of (a) comprise a second hydroxyl-functional acrylic polymer.

5. A refinish composition according to claim 1, wherein the acrylic polymer of (a) has a weight average molecular weight of at least about 17,000.
6. A refinish composition according to claim 1, wherein the cycloaliphatic monomer comprises a member selected from the group consisting of cyclohexyl acrylate, cyclohexyl methacrylate, isobornyl acrylate, isobornyl methacrylate, and combinations thereof.
7. A refinish composition according to claim 1, wherein the cycloaliphatic monomer is at least about 60% by weight, based on the total weight of monomers polymerized.
8. A refinish composition according to claim 1, wherein the cycloaliphatic monomer is up to about 85% by weight, based on the total weight of monomers polymerized.
9. A refinish composition according to claim 1, wherein the acrylic polymer of (a) has an hydroxyl number of from about 45 mg KOH/g polymer to about 75 mg KOH/g polymer.
10. A refinish composition according to claim 1, wherein the acrylic polymer of (a) is polymerized from monomers comprising from about 1% to about 25% by weight of a combination of styrene, n-butyl methacrylate, and n-butyl acrylate, based on the total weight of monomers polymerized.

11. A refinish composition according to claim 1, wherein an about 55% by weight solution of the acrylic polymer of (a) in n-butyl acetate has a viscosity less than or equal to about 10 Stokes at 25°C.

12. A refinish composition according to claim 1, wherein an about 55% by weight solution of the acrylic polymer of (a) in n-butyl acetate has a viscosity less than or equal to about 8.8 Stokes at 25°C.

13. A refinish multi-component coating composition, comprising
- (a) a first component comprising (i) an hydroxyl-functional acrylic polymer that has a number average molecular weight of at least about 5000 and is polymerized using at least about 45% by weight of a cycloaliphatic monomer, based on the total weight of monomers polymerized the hydroxyl-functional acrylic polymer and (ii) at least one film-forming polymer different from the acrylic polymer of (i) wherein the acrylic polymer of (i) is from about 5% up to about 60% by weight of the combined weight of the acrylic polymer of (i) and the film-forming polymer or polymers of (ii) and
- (b) a second component comprising a curing agent reactive with the hydroxyl-functional acrylic polymer of (a)(i) and/or the film-forming polymer or polymers of (a) (ii);
- wherein the refinish coating composition is a clearcoat composition.
14. A refinish multi-component coating composition according to claim 13, wherein the curing agent is reactive with the hydroxyl-functional acrylic polymer of (a)(i).
15. A refinish multi-component coating composition according to claim 13, wherein the at least one film-forming polymer of (a)(ii) is reactive with the curing agent.

16. A method of refinishing a substrate, comprising steps of:
- (a) applying to a desired area of the substrate a layer of a refinish basecoat composition;
 - (b) allowing the applied layer of basecoat composition to dry; and
 - (c) applying over the layer of basecoat composition a refinish clearcoat composition comprising (i) an hydroxyl-functional acrylic polymer, wherein the acrylic polymer has a number average molecular weight of at least about 5000 and is polymerized using at least about 45% by weight of a cycloaliphatic monomer, based on the total weight of monomers polymerized, (ii) at least one film-forming polymer different from the acrylic polymer of (i) wherein the acrylic polymer of (i) is from about 5% up to about 60% by weight of the combined weight of the acrylic polymer of (i) and the film-forming polymer or polymers of (ii), and, optionally, (iii) at least one curing agent reactive with the acrylic polymer of (i) and/or the film-forming polymer of (ii).
17. A method according to claim 16, wherein the clearcoat composition includes the at least one curing agent of (c)(iii).
18. A method according to claim 17, wherein the at least one curing agent of (c)(iii) comprises at least one material reactive with the hydroxyl-functional acrylic polymer of (c)(i).
19. A method according to claim 18, wherein the material reactive with the hydroxyl-functional acrylic polymer of (c)(i) comprises the isocyanurate of hexamethylene diisocyanate.

20. A method according to claim 16, wherein the substrate is an automotive vehicle or a component of an automotive vehicle.

21. A refinished substrate prepared according to the method of claim 16.

22. A refinish composition according to claim 4, wherein the second hydroxyl-functional acrylic polymer has a number average molecular weight of less than about 5000.

23. A refinish composition according to claim 1, wherein the hydroxyl-functional acrylic polymer that is polymerized using at least about 45% by weight of a cycloaliphatic monomer has a number average molecular weight of at least about 8000.

24. A method of refinishing a substrate according to claim 16, wherein the hydroxyl-functional acrylic polymer that is polymerized using at least about 45% by weight of a cycloaliphatic monomer has a number average molecular weight of at least about 8000.

25. A method of refinishing a substrate according to claim 24, wherein the clearcoat composition comprises as a film-forming polymer of (c)(ii) an hydroxyl-functional acrylic polymer having a number average molecular weight of less than about 5000.



EVIDENCE APPENDIX

on means other than toxicants to control marine growths on ship bottoms. Some progress has been reported with silicone coatings that have such low surface free energies that the marine growths have difficulty adhering to the surface (138).

Automotive Refinish Paints. Paint for application to cars after they have left the assembly plant is a major market. Although some of this paint is used for repainting of cars, especially commercial trucks, most is used for repairs after accidents, commonly just one door or part of a fender, etc. In order to be able to serve this market, it is necessary to supply paints that match the colors of all cars and trucks, both domestic and imported, that have been made over the last 10 years or so. The repair shop must be able to order and receive within a day or two a supply of paint to match the color of any car. Repair paints for the larger volume car colors are manufactured and stocked but for the smaller volume colors and colors for older cars, formulas are supplied by the coatings manufacturer to the paint distributor that permit a reasonable color match for any car by mixing standard bases.

The nitrocellulose lacquers used for primers are now being replaced with latex primers. There are two broad classes of top coats, lacquers and enamels. Acrylic lacquers are made from high molecular weight thermoplastic acrylic polymers with cellulose acetobutyrate and plasticizer. They are applied at solids contents as low as 10–12 vol %. They have many advantages. All colors can be matched, including bright metallics that were applied to the original automobiles as lacquers. The gloss retention after exterior exposure approaches that of the factory-applied coatings. From the standpoint of the painter, the main advantage is that the lacquer films reach the dust-free state rapidly. The shops where painting is done have dirt particles and spray dust in the air. If the coating takes a long time to dry to the point where dust particles do not adhere to the surface, the final appearance is poor. Acrylic lacquers also have disadvantages; for example, VOC emissions are very high. The gloss of the air-dry film is too low and the surface must be rubbed to achieve the high gloss necessary for automotive top coats.

The other broad class of refinish coatings is cross-linking coatings, called enamels in the trade. In the United States, enamels are cured at ambient temperatures; in Europe, curing is commonly carried out at temperatures of 60–75°C. Traditionally, the vehicle was an oxidizing medium oil alkyd, with certain advantages over lacquers. The solids are higher, 35–40 vol %, resulting in lower VOC emissions. Furthermore, the same dry film thickness can be sprayed on more rapidly. These films dry to a high gloss and hence do not require polishing. On the other hand, there are disadvantages. Only a limited range of metallic colors can be matched. The films dry more slowly and can pick up dust for several hours. The exterior durability, both gloss retention and color retention, are noticeably inferior to the original finish. Many systems have been devised to overcome the deficiencies of alkyd enamels while retaining the advantages. Acrylic-alkyd graft copolymers dry to a dust-free stage more rapidly than conventional alkyds and show better exterior durability than styrenated alkyds. Another type of acrylic refinish enamel is based on acrylic copolymers with glycidyl acrylate (oxiranylmethyl ester of 2-propenoic acid) as a comonomer. The epoxy groups react with drying oil fatty acids to give a so-called acrylic-alkyd. These afford both faster drying and better durability; the durability is particu-

larly enhanced because the drying is rapid enough, due to the acrylic backbone, that metal driers are not needed. The metal driers used in regular alkyds not only accelerate the drying, but also accelerate the film degradation.

In another approach, the "out-of-dust" time of enamels was significantly reduced by using a polyfunctional isocyanate, such as hexamethylene diisocyanate trimer or isophorone diisocyanate trimer, as an additive just before spraying. The isocyanates react with the hydroxyl groups of the alkyd and give faster drying; two-package urethane coatings with hydroxy-functional acrylics and polyisocyanates have been widely used. Because many painters have decided, rightly or wrongly, that they do not want to use isocyanate systems because some have experienced respiration difficulties after spraying the isocyanate systems supplied by some coatings manufacturers, all manufacturers of refinish coatings are now developing nonisocyanate cross-linking systems. Because human bodies have hydroxyl groups and amine groups, it is doubtful whether a nontoxic system can be developed that reacts with hydroxyl or amine groups on synthetic polymers at room temperature. All that can be done is to try to devise systems with toxic risk as low as possible and train the painters to handle them with appropriate caution. Toxic hazard of reactive cross-linking agents can be minimized by having a molecular weight high enough for their vapor pressure to approach zero and for a low rate of permeation through skin and body membranes. The coatings supplier should provide recommendations for ventilation, protective clothing, and masks but should also recognize that many painters do not comply with safety recommendations.

Traffic Paints. Large volumes of paint are used to mark the center lines and edges of highways. The yellow paints are pigmented with chrome yellow and the white paints with TiO_2 . The paint should be dry enough so that a car can drive over it within minutes after application. The most widely used vehicles are short-oil alkyds with chlorinated rubber using fast evaporating solvents. Immediately after application, glass reflector beads are applied. To an increasing degree, hot-melt coatings are being applied and, in high traffic areas where the lifetime of paints is short, paints are being replaced with thermoplastic tapes.

Acknowledgment

The author wishes to thank Dr. Frank N. Jones for his many helpful suggestions and criticisms.

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 09/965,423
Filing Date: September 27, 2001
Applicants: Ali Rihan and Emerson Keith Colyer
Group Art Unit: 1713
Examiner: Tatyana Zalukaeva
Title: Fast Drying Clearcoat Refinish Composition
Docket Nos.: IN-5501 (BASF)
0906-000311 (Harness, Dickey & Pierce)

Declaration of Ali Rihan Under 37 C.F.R. § 1.132

I, Ali Rihan, do say and declare:

1. I have a B.S. degree in Civil Engineering. I have been employed as a research and development chemist in the automotive refinish coatings field for 3 years. I am an inventor of this application.

2. I prepared refinish clearcoat compositions comparing the acrylic of Example 1 of the application in Example 5 with the acrylic of Comparative Example B based on Example E3 of Rink et al., U.S. Patent Number 5,759,631, modified to have a number average molecular weight at the top of the Rink et al. preferred range in Comparative Example C. The examples were prepared by combining 3 parts by volume of the mixture of materials listed, 1 part by volume of DH-46 Hardener, and 1 part by volume of UR 50 reducer.

	Example 5	Comparative Example C
3 PARTS BY VOLUME OF THE MIXTURE OF:		
Hydroxyl-functional acrylic from Example 2 (AN about 10, OH eq. wt. about 450, Mn about 1000, about 79%NV)	65.7 grams	65.7 grams
EEP (ethyl ethoxypropionate)	13.2 grams	13.2 grams
EBA (ethylene glycol butyl ether acetate)	3.0 grams	3.0 grams
Additive package (containing UV absorbers, tin catalyst, and other customary additives)	2.748 grams	2.748 grams
Acrylic resin of Example 1	15.3 grams	0.0 grams
Acrylic resin of Comparative Example B	0.0 grams	15.3 grams

was combined with:

1 PART BY VOLUME OF: DH-46 Hardener

and

1 PART BY VOLUME OF: UR 50 reducer.

Testing of Example 5 according to the invention and Comparative Example C according to Rink et al.

The Example 5 and Comparative Example C refinish clearcoat compositions were sprayed with a SATA 95 HVLP spray gun using a 1.3mm tip and 43 psi on 4-inch-by-12-inch steel panels. Two coats were applied with a 10 minutes flash between coats to form the clearcoat layer. Both coating layers were allowed to air dry at ambient temperature of 72 F.

RESULTS:

The refinish clearcoat of Example 5 had an average dust free time of 67.5 minutes at an average film build of 2.4 mils.

The refinish clearcoat of Comparative Example C had an average dust free time of 82.5 minutes at an average film build of 2.3 mils. (The slightly thinner film build should dry faster than if the coating had a 2.4 mil-film build as did Example 5. The longer dust free time for Comparative Example C is, therefore, is even more significant considering its lower film build.)

The refinish clearcoat of Example 5 had an average tack free time of 270 minutes at an average film build of 2.4 mils.

The refinish clearcoat of Comparative Example C had an average tack free time of 360 minutes at an average film build of 2.3 mils. (Again, at a thinner film build, the tack free time should be shorter. Nevertheless, the tack free time for Comparative Example C is 33% longer than the tack free time obtained from Example 5.)

3. The refinish clearcoat of Example 5 had a faster surface dry in both tests than the refinish clearcoat of Comparative Example C. The acrylic of our invention allows the surface to dry faster than the acrylic prepared according to the Rink, et al. patent. A faster surface dry is critical in the body-shop refinish business because this allows the customer to move the vehicle being sprayed out of the booth sooner without fear of marring and/or severe dust contamination and to begin processing the next vehicle. The resulting time saved allows for increased productivity.

4. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements and the like if made herein would be punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and may jeopardize the validity of the application or any patent issuing therefrom.



Ali Rihan

December 4, 2002



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 09/965,423
Filing Date: September 27, 2001
Applicants: Ali Rihan and Emerson Keith Colyer
Group Art Unit: 1713
Examiner: Tatyana Zalukaeva
Title: Fast Drying Clearcoat Refinish Composition
Docket Nos.: IN-5501 (BASF)
0906-000311 (Harness, Dickey & Pierce)

Declaration of Emerson Keith Colyer Under 37 C.F.R. § 1.132

I, Emerson Keith Colyer, do say and declare:

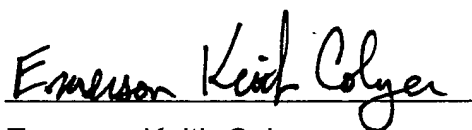
1. I have been employed as a research and development chemist in the automotive refinish coatings field for over 11 years and as a research and development chemist in general for about 17 years. I am an inventor of this application.
2. I read Rink et al. U.S. Patent Number 5,759,631. I considered Example E3 from the Rink et al. patent to most closely approach the composition of my invention. I prepared a resin solution of the Example E3 resin from the Rink et al. patent which had a higher number average molecular weight, M_n , than reported in Rink et al. patent example E3 (reported M_n 2711). The higher M_n was a result of using a lower strength initiator solution. The Rink et al. patent discloses in Claim 7 a preferred number average molecular weight range of 1800 to 4000. Consequently, at M_n of 4100, the comparative example resin is closer to the lower M_n limit of our invention but still about the preferred number average molecular weight of the Rink et al patent.

3. I carried out the synthesis as follows.

Comparative Example B. Preparation of Acrylic Polymer according to Rink et al., U.S. Patent Number 5,759,631, modified from Example E3.

An acrylic co-polymer was prepared by polymerizing a mixture comprising 42 parts by weight t-butyl-cyclohexyl acrylate, 29 parts by weight hydroxypropyl acrylate, 16 parts by weight styrene, 7 parts by weight 2-ethylhexy acrylate, 6 parts by weight n-butyl methacrylate, and 0.5 parts by weight 2-mercaptoethanol in Solvesso100 using a mixture of t-butylcumyl peroxide in xylene at 145°C. over 4 hours. The resin product was reduced to ~62% non-volatiles with n-butyl acetate. The resultant resin had a number average molecular weight of about 4100 as determined by GPC using polystyrene standards.

4. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements and the like if made herein would be punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and may jeopardize the validity of the application or any patent issuing therefrom.



Emerson Keith Colyer

December 4, 2002

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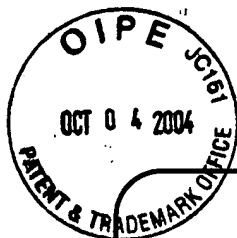
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**TRANSMITTAL
FORM**

(to be used for all correspondence after initial filing)

TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	09/965,423
	Filing Date	September 27, 2001
	First Named Inventor	Ali Rihan et al
	Art Unit	1713
	Examiner Name	Zalukaeva
Total Number of Pages in This Submission	Attorney Docket Number	0906S-000311

ENCLOSURES (check all that apply)

<input checked="" type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment / Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance Communication to Technology Center (TC) <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input checked="" type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): Return Postcard		
<table border="1"><tr><td>Remarks</td><td>The Commissioner is hereby authorized to charge any additional fees that may be required under 37 CFR 1.16 or 1.17 to Deposit Account No. 08-0750. A duplicate copy of this sheet is enclosed.</td></tr></table>			Remarks	The Commissioner is hereby authorized to charge any additional fees that may be required under 37 CFR 1.16 or 1.17 to Deposit Account No. 08-0750. A duplicate copy of this sheet is enclosed.
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name Anna M. Budde	Reg. No. 35,085
Signature	<i>Anna M Budde</i>		
Date	October 4, 2004		

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☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 340

Complete if Known

Application Number 09/965,423
Filing Date September 27, 2001
First Named Inventor Ali Rihan et al.
Examiner Name 1713
Art Unit Zalukaeva
Attorney Docket No. 0906S-000311

METHOD OF PAYMENT (check all that apply)

☒ Check ☐ Credit card ☐ Money ☐ Other ☐ None
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FEE CALCULATION

1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1001	790	2001	395	Utility filing fee	
1002	350	2002	175	Design filing fee	
1003	550	2003	275	Plant filing fee	
1004	790	2004	395	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1)

(\$ 0)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims		-20 **	=	0	X		=	0
Independent Claims		-3 **	=	0	X		=	0
Multiple Dependent					X		=	0

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1202	18	2202	9	Claims in excess of 20	
1201	88	2201	44	Independent claims in excess of 3	
1203	300	2203	150	Multiple dependent claim, if not paid	
1204	88	2204	44	** Reissue independent claims over original patent	
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent	

SUBTOTAL (2)

(\$ 0)

**or number previously paid, if greater; For Reissues, see above

3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	430	2252	215	Extension for reply within second month	
1253	980	2253	490	Extension for reply within third month	
1254	1,530	2254	765	Extension for reply within fourth month	
1255	2,080	2255	1,040	Extension for reply within fifth month	
1401	340	2401	170	Notice of Appeal	
1402	340	2402	170	Filing a brief in support of an appeal	340.00
1403	300	2403	150	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,370	2453	685	Petition to revive - unintentional	
1501	1,370	2501	685	Utility issue fee (or reissue)	
1502	490	2502	245	Design issue fee	
1503	660	2503	330	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	790	2809	395	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	790	2810	395	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	790	2801	395	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3)

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SUBMITTED BY

Name (Print/Type) Anna M. Budde Registration No. (Attorney/Agent) 35,085 Telephone (248) 641-1600
Signature Anna M Budde Date October 4, 2004

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